

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Algebra 1B Pd: \_\_\_\_

**Weekend Word Problem: Projectile Motion**

**The Situation:** The height of an object that is projected into the air can be calculated using the quadratic equation:

$$h = -16t^2 + vt + c$$

where: -16 is a constant to represent gravity in ft/sec

h = height of object                      t = time in the air

v = initial velocity                      c = initial height

**Kirk Cousins throws a football in an arc from an initial height of 6 ft at an initial velocity of 80 ft/sec.**

**a. Write the equation for the situation, filling in the values for initial height and initial velocity and leaving h and t as variables.**

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**b. Circle the correct word in each parentheses:**

Since the coefficient of  $t^2$  is -16, the parabola will open ( upward, downward ), the vertex is the

( maximum, minimum ) point and the parabola is ( wider, narrower ) than the parent function.

**c. SKETCH the parabola below.**

**d. Find the t coordinate of the vertex using  $\frac{-b}{2a}$  to find how many seconds it will take the football to reach its maximum height.**

**e. Find the h coordinate of the vertex using your t coordinate, substitution and evaluation to find the maximum height of the football.**

**f. Write at least ONE complete sentence to describe the throw in an algebraic sense. Use the VALUES you discovered in parts d and e.**

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**g. Write at least ONE complete sentence to describe a specific situation where the formula for projectile motion would be useful in the real world (do not use sports).**

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